

DOCUMENT RESUME

ED 445 841

RC 022 516

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TITLE Knowledge as a Resource--Networks Do Matter: A Study of SME Firms in Rural Illinois.
INSTITUTION Western Illinois Univ., Macomb. Illinois Inst. for Rural Affairs.
PUB DATE 2000-00-00
NOTE 9p.
AVAILABLE FROM For full text: <http://iira.org/pubs/#RurRsrch>.
PUB TYPE Collected Works - Serials (022) -- Reports - Research (143)
JOURNAL CIT Rural Research Report; v11 n1 Win 2000
EDRS PRICE EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Attitudes; Business Communication; Continuing Education; Education Work Relationship; *Entrepreneurship; *Informal Education; Networks; Organizational Climate; *Organizational Effectiveness; Rural Areas; *Small Businesses; Technical Assistance
IDENTIFIERS Illinois; *Knowledge Networks; *Networking

ABSTRACT

Networks among people and businesses facilitate the capture and diffusion of technical and organizational knowledge and can be classified by type of knowledge being exchanged. Types include buyer-supplier information, technical problem-solving information, and informal community information. A survey of 141 small and medium-sized enterprises (SMEs) in rural northeastern Illinois found that not all SME principals saw networks as providing knowledge that benefited their firm, and as a result, network composition and intensity differed. Those firms not perceiving a benefit maintained less intensive networks, focused more on experiential information, and sought information about what is or has been done. The knowledge acquired was adapted to the SME's particular situation and used to improve operations, but the benefits from networking were not maximized. Those perceiving benefits from their networks maintained more intensive, wide-ranging, and overlapping networks. While they also gathered information about what is being done, this group actively maintained contacts with forward-looking expertise and focused on potential. Firms who valued networks were proactive in maintaining them, converted information into new knowledge, and thereby gained competitive advantage and improved performance. Many SMEs that did not value networking did value continuing education, but programs oriented toward the majority may be beyond the comfort zone of this group. Universities, research agencies, and business assistance agencies might better serve high-performance firms by positioning themselves as "contact facilitators." (Contains 14 references.) (TD)



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N. Walzer

Rural RESEARCH REPORT

Winter 2000
Volume 11, Issue 1

Published by the Illinois Institute for Rural Affairs

Stipes Hall 518
Western Illinois University
1 University Circle
Macomb, IL 61455-1390
309/298-2237
www.IIRA.org

Knowledge as a Resource—Networks Do Matter: A Study of SME Firms in Rural Illinois

by Dr. Emeric Solymossy¹

"Networking" has become one of the buzzwords of the 1990s and the Information Age. We have all heard variations of the phrases "it's not so much what you know, it's who you know that counts," or "it's not so much what you know as knowing where to find the information." Economic environments are changing at an unprecedented rate. New and emerging technologies alter products, methods of production, and ways of doing business. These changes have not only increased the amount of information that is available but have also increased the necessity for those in business to deal with greater quantities of information, to acquire essential knowledge, and to determine what is relevant for their particular needs.

Patterned relationships among people and firms create a social structure—a network—that can facilitate or constrain the actions of individuals, groups, and organizations (Aldrich and Zimmer, 1986). Networks enable small businesses to assemble scarce resources (Birley 1985; Ostgaard and Birley 1996) and facilitate their growth (Jarillo 1989). Without external contacts, a small- or medium-sized (SME) enterprise's capabilities are limited to its own resources and abilities. As a result of network participation, small firms can successfully compete with larger organizations while maintaining flexibility and innovativeness.

Information alters or reinforces understanding and becomes knowledge if it can be applied. Knowledge is a critical resource. The modern economy has been defined as a "knowledge-based system . . . [wherein] knowledge is the most important resource . . . and learning is the most important process" (Bergeron, Lallich, and LeBas 1998, 733). Networks, by emphasizing the flow of information, facilitate

the capture and diffusion of technical and organizational knowledge and can be classified according to one of three types of information being exchanged: (1) buyer-supplier information, (2) technical problem-solving information, and (3) informal community information (Carlsson 1997).

The community network is informal and relatively stable, characterized by personal contacts among individuals within a variety of industries and occupations, and it can be both extensive and loosely knit. A typical community network may involve participation in the Chamber of Commerce, the PTA, a community service organization, a church, sporting/social circle, or any combination of similar activities. Contacts, conversations, and the information exchanged may not be focused upon "business" per se. Informal associations can, however, provide the opportunity to meet and become acquainted with a variety of people from diverse backgrounds and professions. The community network is influenced by shared values and emotional attraction from a personal rather than a purely business perspective (Johannisson 1996).

The technical problem-solving network, which frequently overlaps the buyer-supplier linkage, is based on participants having a shared issue or problem of a technical or technological nature. Problem-solving linkages focus on the transfer of knowledge rather than the exchange of goods and services. For example, a crop farmer maintains contact with the agricultural department at a public university to have access to scientific expertise. This expertise might be utilized to help resolve a new and unique problem or to stay abreast of the latest developments within the field. This demonstrates a link in a technical network focusing on

¹The author is Assistant Professor, Department of Management, Western Illinois University Regional Center. Support for this research was provided by the Illinois Institute for Rural Affairs. The author thanks Jon Richards, Director of the Business Development Center, Southwestern Oregon Community College, and Bo Carlsson, Associate Dean of Research, Case Western Reserve University, for review of this report. Layout by Darrell L. Sutton.

exchanging information yielding knowledge but not the direct flow of traditional "products" or tangible resources. The farmer benefits by having access to scientific expertise—a valuable resource. The benefit to the university is access to the practitioner's perspective—the applied, experiential knowledge of the farmer—a valuable resource to the university.

Research Objective and Methodology

While it is known that networking activity promotes resource acquisition and is related to competitive information scanning activities, prior research has not looked at networking's role in the transfer of information yielding economically valuable knowledge for SMEs. These firms are prevalent in rural Illinois, and their viability is essential to the economic stability of the region. The objective of this research is to assess whether principals of SMEs in rural Illinois perceive a knowledge benefit to networking. An analysis of their networking activities and related consequences will add to the understanding of ways in which rural firms may differ from nonrural firms.

Findings

Descriptive information about the respondents is shown in **Table 1**. Overall, this information is comparable to reports from other SME research (e.g., Lee, Rogoff, and Puryear 1998, Van Auken and Neeley 1998). While there is a relatively high representation of businesses in agricultural industries, this is to be expected given the nature of the geographic area studied.

Two principal questions motivated this research: (1) Do networks provide knowledge that benefits SMEs? and (2) If yes, what are the different types of knowledge-networks used by SMEs? Networking activity was measured by contacts per month within each of the following seven categories: (1) academic institutions, (2) research agencies, (3) business assistance agencies, (4) external consultants, (5) trade shows and industry associations, (6) other businesses, and (7) relatives and friends. In addition, network contacts were categorized according to three types of knowledge: (1) buyer-supplier, (2) technical problem-solving, and (3) community contacts.

The buyer-supplier linkage, on the other hand, focuses on information that will enhance the flow of materials, thus, facilitating the exchange of tangible goods and services. This linkage is demonstrated by the same farmer maintaining contact with seed producers or brokers. These contacts provide information about market conditions, competition, alternative products, and methods of getting the produce to the marketplace, thereby providing knowledge that enhances the flow of tangible resources.

A lengthy questionnaire was sent to 1,250 northeastern Illinois for-profit businesses having fewer than 300 employees.² Eighty-two were returned by the post office; 32 were returned by recipients as being either not applicable or with refusals; and 141 completed responses were received, yielding an adjusted response rate of 12.5 percent. This response, which was anticipated given the complexity of the instrument, was deemed to be sufficient for exploratory purposes.

Table 1. Respondent Characteristics

		N	Avg.	S.D.	Range	
Age of Respondents		139	51.9	11.3	24-81	
Age of Firm		137	23.6	18.4	2-87	
Number of Employees		131	4.6	7.1	0-50	
		N	Manuf.	Services	Trade	Agri. Trans/Constr.
Industry (percent)	139	4	60	20	29	26
		2.9	33.2	14.4	20.9	18.7
		N	HS or less	Some College	Bachelor's	Post-Grad.
Education (percent)	141	41	41	32	27	
		29.1	29.1	22.7	19.1	
		N	Principal	NonPrincipal		
Ownership Position (percent)	136	130	6			
		95.6	4.4			
Gender (percent)	133	111	22			
		83.5	16.5			

Source: 1999 Illinois Networking and Technology Survey.

²Firms were located in Bureau, Carroll, Henderson, Henry, Jo Daviess, Knox, Lee, Mercer, Ogle, Peoria, Rock Island, Stark, Stephenson, and Whiteside Counties

In response to the first issue, whether or not there is a perceived benefit from knowledge-networks, a strong majority of respondents (78 percent) indicate that network contacts do provide knowledge of significant benefit to their business (for simplicity, this group will hereafter be referred to as the BEN group). Twenty-two percent indicated that networks do not provide knowledge of significant benefit to their firm (this group will hereafter be referred to as the NOBEN group). Based upon these contrasting perspectives, differences can be anticipated in the types of information shared, the type of contacts being maintained, and the intensity with which networking contacts are maintained. In addition, since knowledge is believed to be a critical resource, it is anticipated that differences extend to firms having a competitive advantage because of their network usage.

No significant differences were found between the two groups in ownership position, age, gender, education, or income level. Likewise, responses showed no significant differences in either business age or industry.

Differences in Types of Knowledge. Analysis of contact intensity and frequency for the three types of knowledge shows significant differences in the knowledge areas of buyer—supplier and informal community information, with the BEN group maintaining significantly higher contact levels in these areas. A significant difference does not exist in the average number of contacts for technical/problem solving networks. The firm that perceives a significant benefit from networking (BEN group) is more intensive in its networking activities. These firms maintain an average of 6 contacts per month more than those firms that do not perceive a benefit (Buyer/Supplier = 3, Technical, Problem-Solving = .6, Informal Community Information = 2.5).

Differences in Sources of Knowledge. Contact frequency with the various sources of information also shows major differences between the two groups in six of the seven categories (all sources except for trade shows and industry associations). On average, the BEN group has 5.1 more contacts per month with friends and relatives, 2.7 more contacts per month with other businesses, and 1.2 more contacts with other consultants. Within this group, there were as many as 3.33 contacts per month with research institutes; by contrast, not a single NOBEN respondent indicated contact with a research institute. While an average difference of five contacts per month may not seem significant (five phone calls or personal visits may not be excessive), the magnitude of the differences is surprising. On average, the BEN group has 28.7 times as many contacts per month based on the three types of knowledge, and 18 times as many contacts per month with their sources of information and knowledge.

The question of whether an SME realizes economically valuable knowledge benefits from their networking activities is valid and meaningful. The practical importance of the issue is reflected in the intensity with which the firm maintains contacts. The issues of whether the NOBEN firms do not recognize benefits because of insufficient contact or whether they maintain less contact because they do not perceive any benefits are not addressed. This question could best be answered by a focused, in-depth, longitudinal study, which was beyond the scope of this inquiry.

Differences in Competitive Advantage. Using a Likert Scale with 1 as low competence and 5 as high competence, respondents rated themselves in each of eight areas potentially offering a competitive advantage (Porter 1985). Three of these eight areas exhibit significant differences—two related to technology, the third with accessibility to the market. While there is no difference between the BEN and NOBEN groups in the competitive areas of price, quality, breadth of product offerings, or differentiation (either by focus or by higher levels of service), the BEN group, on average, believes itself to have a competitively superior position because of access to the market. This may be because they are more actively seeking information about the marketplace (there was a pronounced difference on the buyer/supplier knowledge). Due to the increased information flows from networking, firms become more confident in evaluating themselves compared with their competition (Provan and Human 1999). The NOBEN group, being positioned to have less market information and knowledge, may not be informed enough to fully compare themselves to their competition.

There are also significant differences between the two groups in technologically oriented competitive advantage (both product and process). It was previously shown that no difference existed between the two groups in the technical/problem solving knowledge as a *type* of knowledge. It was, however, shown that differences existed in their *sources* for acquiring information and knowledge and in the frequency with which they maintained contact. Those previous findings help explain the difference observed in technologically oriented competitive advantages. The members of the BEN group, having more intense contact with research agencies, consultants, and other businesses, position themselves to receive more and different information than if they relied only upon other businesses. While quantity does not equate to quality, a greater frequency of contacts with different sources permits information acquisition to be more comprehensive and potentially more fruitful. This appears to translate into the firm developing or acquiring unique production/process technology, giving them a competitive advantage. Since the range of sources provide more diverse and unique information, these firms must assimilate the information and innovatively apply it to create their unique knowledge.

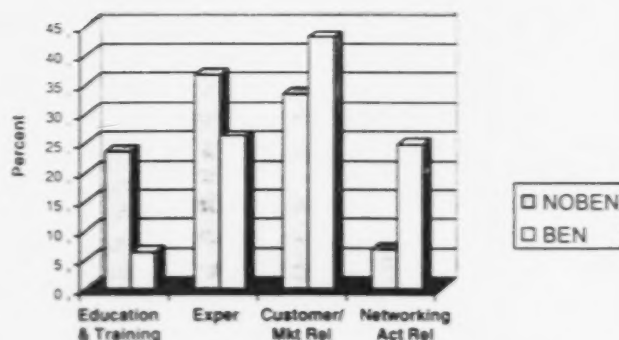
Beyond the significant difference in their perception of competitive strengths in the two "technology" areas and, in addition, a complete absence of contact with research agencies, it is remarkable that not a single respondent within the NOBEN group scored themselves a "5" in either of the technology areas. Not one of the NOBEN respondents felt themselves to have very strong technological competitive advantage in either of the technology domains—in spite of 18 percent of the NOBEN group having advanced degrees.

Networking activities can and do influence whether or not a business achieves competitive advantage and, likewise, how they compensate for areas within which they do not have an advantage. Both groups indicate that customer focus, education, training, and experience are sources from which they acquired competitive advantage. There is, however, a sharp contrast in how the two groups credit these sources for enabling their advantage. Among the NOBEN group, 23 percent indicate that their advantage stems from education and training, while only 6.6 percent identify their advantages as resulting from networking activities. This is virtually the opposite of the BEN respondents, of which 25 percent identify networking activities as the root source of their advantage, and 6.3 percent cite education and training (see Figures 1A and 1B).

Differences in networking activities also affect how firms react to perceived competitive disadvantages—how they compensate for the areas in which they are weaker than their competition. While both groups have similar levels of "live-with-it" approaches, 38.5 percent of the NOBEN group members indicate that they avoid or abandon areas with superior competitors. Among the BEN group, only 1.3 percent abandon or avoid, while 18.5 percent indicate that they pursue networking activities as their compensation mechanism.³ This compares to only 4 percent of the NOBEN group members citing networking activities as a compensation mechanism. Also noteworthy is the higher percentage of BEN respondents who compensate by increasing their efforts in focusing on market factors, such as improving customer service or finding new markets as a means of differentiating themselves, or by focusing on internal operations, such as reducing costs or improving product quality (see Figures 1A and 1B).

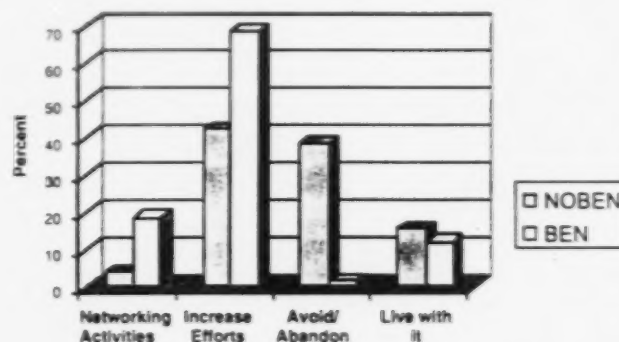
Differences in Network Patterns. Numerous differences have been discussed as being apparent between the groups that realize or do not realize a significant benefit from their networking activities. There are even more pronounced differences in their network relationship patterns. To identify these patterns, correlation matrices were calculated showing the correspondence between the types of knowledge and the sources of knowledge. The strongest relationships

Figure 1A. Competitive Advantage Sources



Source: 1999 Illinois Networking and Technology Survey.

Figure 1B. Competitive Disadvantage Compensation Mechanisms



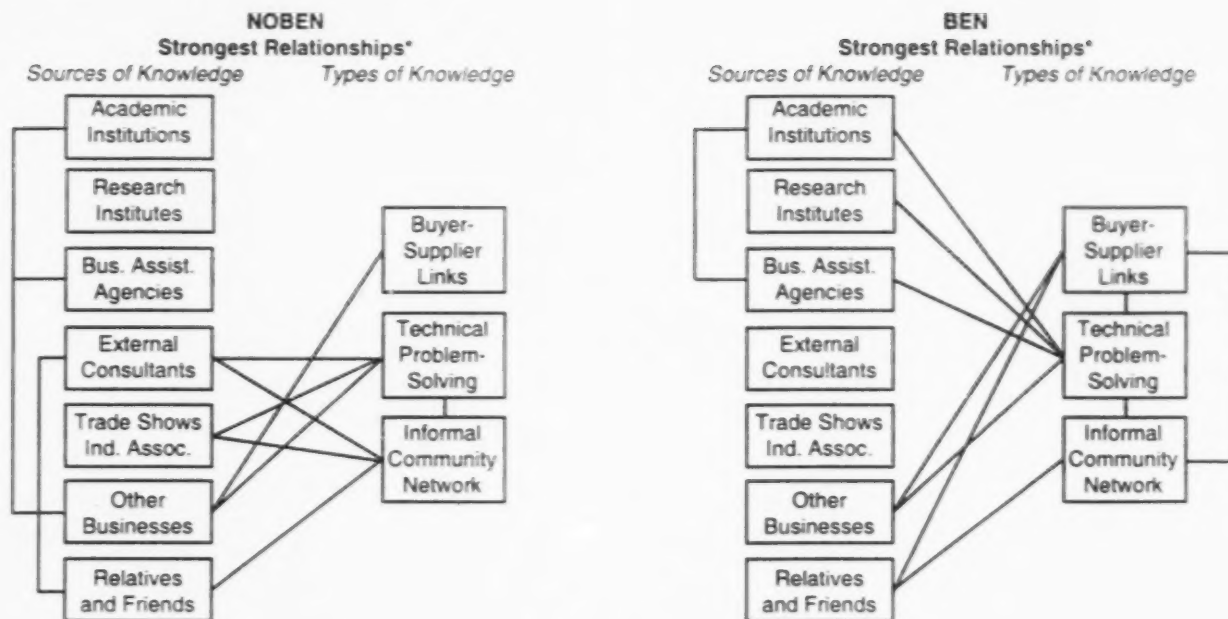
Source: 1999 Illinois Networking and Technology Survey.

identify the knowledge network patterns of each group (see Figure 2).

Within the NOBEN group, each of other businesses, trade shows (and industry associations), and external consultants shows strong relationship to two types of knowledge. This demonstrates some overlap; information from each of these sources is applied in more than one area. Relatives and friends only link to informal community information, indicating a limited use of this source of information. The NOBEN group has one principal source of information for buyer-supplier knowledge—other businesses. By relying on other businesses, they acquire knowledge that is new to them but not to others within their business community. This affords them parity but not superiority. This may minimize competitive disadvantage but cannot provide competitive advantage.

³ A sampling of the responses interpreted as being network related include the following: "refer to experts in that field," "networking," "anything we hear about in networking, trade shows, books, classes," "seminars, trades shows, publications," and "research."

Figure 2. Knowledge Network Relationships



(Only those relationships showing 99.9 percent confidence)

Source: 1999 Illinois Networking and Technology Survey.

They do have multiple sources for both the problem-solving and informal information networks, however. These sources emphasize practical experience, whether from friends and relatives, other businesses, trade shows, or industry consultants. The absence of a linkage between buyer-supplier knowledge and technical problem-solving knowledge hints at a possible weakness—the inability to realize benefits from transferring information and knowledge between applications. There are, however, three sources for both technical problem-solving and informal information, as well as a strong relationship between these two.

The relationship between business assistance agencies and academic institutions is spurious, since the majority of such agencies in this region have ties to community colleges or universities. Business assistance agencies offer referrals/contacts to other businesses, and referrals to external consultants are frequently made by friends and relatives. The NOBEN group's pattern is notably missing any strong relationships with academic institutes, research institutes, and business assistance agencies—each of which represents specialists having unique information, specialized knowledge, and contacts with others of similar levels of expertise.

The BEN group exhibits a much broader and more inclusive network pattern, demonstrated by the presence of more strong, corresponding relationships. For example, their technical problem-solving network extends beyond other businesses to include academic institutions, research agencies, and business assistance agencies. Likewise, the buyer-supplier network is expanded to include relatives and friends, affording the possibility of unexpected sources of potentially valuable information. The BEN group's network also has one singular link, this being between informal information exchange and relatives and friends. The strong linkages between all three types of knowledge suggests that this singularity may be meaningless. The most obvious difference between the two group's networking patterns is in the area of technical problem-solving knowledge and how balanced it makes the entire network appear.

The patterns in the BEN group's networks exhibit access to both the experientially based knowledge and to formal knowledge expertise which may not be otherwise distributed (or known) within their business environments. Insight into what these different patterns mean is aided by considering differences in cognitive style—the mental process through which knowledge is acquired. Research has shown that cognitive styles vary significantly among people.

A simple classification scheme applicable to the business environment is afforded by the KAI theory, which maintains that people tend to be adaptors or innovators based on their approach to solving problems (Kirton 1976). Adaptors tend to be conservative, exploring solutions within generally accepted guidelines and frameworks. Innovators, on the other hand, may consider the existing guidelines and frameworks as part of the problem to be resolved, seeking and incorporating radical processes or ideas as part of their solution.

From a strategic perspective, the adaptive style focuses on doing things better and being comfortable with incremental improvements. The innovative style develops the ability to do things differently, frequently combining varied ideas to come up with radically new solutions (Kirton 1980 as cited in Brigham and Reed 1999). The differences in the composition and patterns of the two group's knowledge networks suggest that the NOBEN group is more "adaptive." Being more "adaptive," their networking relationships are constructed to support the NOBEN group's need to learn what *is being* or *has been* done by others that could be applied to their current situation—experiential, extant knowledge. The BEN group, with a need to learn what could be done differently, appears to be more "innovative," actively seeking experiential and experimental, extant and potential knowledge.

Firm Behavior Consequences. Within the NOBEN group, there are no significant relationships between networking activities and performance outcomes. Their network activities do not appear to have any meaningful effect upon their economic performance. There are, however, several *negative* relationships indicated in other areas of the firm's behavior. A negative relationship exists between the firm's competitive attitude, informal/community networks, and contacts with other businesses. Likewise, a negative relationship exists between the SME principal's perception of change in the environment and contact with business assistance agencies and other businesses. This implies that beyond the network's not having a beneficial effect upon the firm, there are perceived negative consequences. Information acquired through networks may highlight the firm's competitive deficiencies (supporting a belief in their not having a competitive advantage). Also, it appears that this group's networking activities, being more limited, serve to make the business less aware of changes in the business environment.

There is also the possibility that the NOBEN group may achieve a point of information overload. Comfort levels are maintained by using "tried and true" knowledge from sources

that support this. Contact with research agencies and more contact with academics would introduce new and different information requiring processing by the firm. This information, being on the leading edge of new knowledge, would be outside of the comfort zone and require change. These firms do not appear to pursue change; they cope with it.

The more "innovative" BEN group is actively seeking knowledge from many different sources. They also pursue contact within the realms of emerging knowledge and expertise, such as academics and research institutes, to supplement their contact with experience. This gives them access to "new" information and knowledge which they transform into competitive advantage. The significant correlations between each of the three types of knowledge further suggest substantial overlaps within these networks and that creative/innovative processes are being utilized to transfer information between differing knowledge needs.

Performance Consequences. From a practical perspective, perhaps the most meaningful differences between the two groups are the significant relationships (at the 95 percent confidence level) between the knowledge networks and the performance measures exhibited by the BEN group. Those firms that perceive a benefit to their networks apply the information they acquire to generate new knowledge, subsequently converting this knowledge into a competitive advantage, which results in measurable, positive results to the firm.

Further analysis was conducted to assess how knowledge networking activity affected the performance of the firm.⁴ This testing categorized firms by economic performance levels and then sought to determine what differentiated high-performance firms from those that did not perform as well. Sales growth of the firm is positively affected by contact frequency for exchanging technical knowledge and by the frequency of contact with consultants and friends and relatives. Both the SME principal's income and a composite measure of economic success (combining income, sales growth, and employment growth) show statistically significant effects from networking activities (with 95 percent confidence). Income levels are affected by contact with consultants; this contact corresponds to additional income for the SME principal which supports the indications evidenced for sales growth. Within the economic composite category, technical knowledge as a type of knowledge and contact with academic institutions and trade shows/industry associations as sources corresponds with increased economic success. This supports earlier indications that firms which acquire and convert knowledge into a competitive advantage demonstrate improved economic results.

⁴ Analysis was performed using MANOVA. The output of these tests are available from the author in a summarized form.

Conclusion and Implications

This research finds that not all SME principals see networks as providing knowledge which benefits their firm, and, as a result, network composition and intensity differ. Those firms not perceiving a benefit maintain less intensive networks, focus more on experiential information, and seek information about what *is* or *has been*. The knowledge acquired is adapted to the SME's particular situation and used to improve operations. The benefits from networking are not, however, maximized, and, consequently, the value of networking is not recognized by the individual.

Those perceiving benefits from their networks maintain more intensive, wide-ranging, and overlapping networks. While they also gather information from others regarding what is being done, this group actively maintains contacts with forward-looking expertise. This emerging knowledge base is most pronounced in technological and problem-solving networks, supplements experientially based information, and appears to focus on *potential*. At the same time, technological and problem-solving type of knowledge exhibits a strong correspondence to the economic growth of the firm as well as the personal income of the principal. These findings offer further support to previous research which had suggested that high-growth firms' networks are more future-oriented, while lower growth firms' networks focus on the here and now (Ginn and Sexton 1989).

The data suggest that firms who value networks are proactive in maintaining them, appear to convert information into new knowledge, and, as a result, gain competitive advantage that is subsequently reflected in the performance of the firm. The popular adage of "it's not what you know, it's who you know" has evidentiary support from an economic standpoint.

While these suggestions are believed to be generalizable to the SME community in western Illinois, individual consideration must be given to the specific firm regarding its physical location and industry. Rural businesses, being removed from the greater business community, will have more difficulty establishing and maintaining the synergistic networks necessary for creating new knowledge. Therefore, rural businesspeople may have to focus networking activities on the type of knowledge that is most beneficial for achieving their objectives. If the majority of their networking requirements pertain to the flow of materials, efforts should be directed towards nurturing buyer-supplier knowledge networks. On the other hand, if the principal need is the flow of information and knowledge rather than materials, efforts to nurture technical, problem-solving networks would be more appropriate.

These findings have potentially significant implications for both businesses and providers of services and support to SMEs. For the business practitioner, the findings are relatively clear: Whether you perceive benefits from networking or not, there are measurable benefits to networking provided the firm is disposed to capitalize on the information / knowledge capacity of networks. Contact with academic institutions and consultants for technical and problem-solving knowledge has positive economic effects upon the performance of the firm. This suggests that some business principals may have to change their attitudes about networking, applying themselves to more effective usage by expanding their contacts and seeking information from more than the traditional "friends and other businesses" sources.

These findings also carry implications for institutions, agencies, and policymakers. A sizeable population of SME firms seek "tried-and-true," experiential information and knowledge that is applicable to their specific context. This group does not believe that networking has a value to them, but does believe that education and continuing education does. Education that can be applied is currently available through community colleges, business assistance agencies, and through industry associations and trade shows. Such programs generally emphasize the applicability of the information and knowledge. It may be beneficial, however, to consider whether these programs are intended as a "be-all, to-all." Based upon this study, the information and knowledge needs of the SME community are not universal. Programs oriented toward the majority may be beyond the comfort zone of the NOBEN group, placing them into information overload.

The larger population represents the more successful firms, which are actively engaged in seeking emerging knowledge offering the potential for competitive advantage. Universities, research agencies, and business assistance agencies might serve the high-performance firms better by positioning themselves as contact facilitators—a source of information and knowledge exchange that transcends the traditional measures of being able to be applied immediately. One way this could be accomplished would be to build and maintain regional databases of "experts" which could be accessed by business. Another is by encouraging and rewarding researchers, scientists, and professors for maintaining high levels of availability for and access to the business community.

Although the role of the Internet and advanced communication technologies was not investigated by this

research, the relationship with contact frequency indicates that information quantity as well as quality are important. The Internet offers superior possibilities for information quantity. The quality component, however, is weak, forcing the searcher to qualitatively evaluate the relevance and value of endless streams of data. Institutional and agency expertise would complement the Internet's quantitative superiority by adding the qualitative, evaluative component. There is evidence of this being done in other regions (e.g., St. Louis University's "E-Web" [www.slu.edu/eweb/], the Family Business network [www.imd.ch/res/family/fbn.html], and the Canadian Management Network's resource service [strategis.ic.gc.ca/sc_mangb/contact/engdoc/homepage.html]); however, this does not appear to be happening to date in western Illinois. This would be yet another way that the needs of the high-performance firms could be supported. All three of these efforts would require

ongoing support from policymakers and administrators by allocating the funds necessary to establish, promote, and maintain such activities.

While these findings are statistically significant and meaningful, they must be used with some caution. This study explores new veins of inquiry with a moderate sample size. The indications provided by this research are meaningful since the study is focused specifically on a single class of resource exchange within networks and has sought to not only clarify the nature of information and knowledge as a resource but to assess its value from both a perceptual and an outcome perspective. Future research could explore these relationships further, could expand upon the basic framework presented, and would be more suitable to rigorous statistical analysis resulting in improved generalizability.

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